Atmospheric Entry Probes: Needs and Prospects

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The Needs: There is only one Rosetta Stone in the solar system and it's in the British Museum. We cannot hope to understand the big problems of origin and evolution by studying only one planet or one comet. Indeed, we must be able to make comparative studies even to understand a single planet. Thus our strong need to improve our knowledge of Jupiter is inextricably coupled to the necessity to achieve a comparable understanding of Saturn, Uranus and Neptune. In the inner solar system, we have to bring Venus studies at least to the level we have achieved for Mars.

The Prospects: Various missions involving entry probes are currently under consideration by both NASA and ESA. To accomplish the kind of progress we desire in the outer solar system, however, there must be a technology development program to ensure that the materials required for heat shields will be available for these probes. We also need more investigations of possible modes for probe delivery, e.g., involving NEP, and methods for deep probe deployment and communication. A combined program of entry probes with varying locations and depths plus pole-to-pole microwave sounding from orbiters or flybys promises the greatest scientific return.